PAPERS

IN

CHEMISTRY.

No. I.

MELTING-POTS.

The Sum of TWENTY POUNDS *was this Session presented to Mr.* CHARLES SIDNEY SMITH, *for his Method of manufacturing Melting-pots for Iron and Steel.*

IT appeared in evidence before the Committee, that Mr. Smith's pots were made while he was in the service of a manufacturer of metallic axle-trees, who therefore had occasion for a considerable quantity of metal castings. The fusions were performed in earthen pots, each of which was required to stand an entire day's work without cracking, or becoming leaky by the formation of small holes called pin-holes.

The failure of a pot is a serious inconvenience, both on account of the loss of time and of metal, as well as of the interruption which it creates. Great variations are observable in the duration of pots from different makers, and even in those by the same maker; arising not so much from difference in the materials employed, as from

a difference of skill or care in mixing the ingredients, and in the other parts of the manipulation. Whenever a bubble of air is left in the clay after being tempered, a pin-hole in the pot made of such clay will be the common result, for the pressure of the melted metal will probably force a way through this weak part.

In order to submit the pots made by Mr. Smith to a very severe trial, one was kept constantly in work for two days and the intervening night; during which time it received twenty-three charges, of 70 lbs. each, of cast-iron. Another pot was worked for three successive days, being raked at night in order to prevent it from cooling: under this management it received eighteen charges of cast-iron, of the same weight as the former.

Neither of the pots had cracked or leaked in the least, but were now become unserviceable from the lip having been worn down into the side, in consequence of the necessity of knocking away the scoriæ after each fusion, which could not be done without breaking down a little of the lip.

The pots made by Mr. Smith are composed of the three following ingredients:—Stourbridge clay, coke, and plumbago, or black lead, as it is usually called.

Stourbridge clay comes to market either ground or in lump; the price charged for each is the same, and therefore the latter is to be preferred, as less mixed with impurities. A convenient quantity of this clay is to be put on a sieve 1-4th of an inch in the mesh, and is to be carefully hand-picked, all pebbles and other impurities being thrown aside; it is then sifted on a board and put into a bin. Those pieces which will not pass through are transferred to a mortar with a spring pestle, in which they are pounded till they are fine enough to pass through the

fine sieve, the meshes of which are 1-8th of an inch wide. This fine clay is put in a barrel by itself.

The coke is thus prepared:—The masses, in the state they come out of the oven (for gas coke is of inferior quality), have their tops and bottoms knocked off; the middle part only, which is of a uniform firm texture, being reserved for use. The coke is now to be pounded, taking care so to manage, by moderating the blow of the pestle, that as little dust as possible may be made. When duly pounded, it is to be thrown on the fine sieve, and all that passes through is to be rejected; it is then to be transferred to the coarse sieve, and what comes through is now of a proper size.

The plumbago is Mexican, and is to be reduced to a very fine powder.

The board called the *walking* board, on which the mixing and tempering the ingredients is performed, is six feet square, having cross pieces on the underside to raise it about an inch from the ground. The process commences by mixing on the coarse sieve eight quarts of clay and five quarts of coke, and sifting them together on the walking board; here they are to be still farther mixed by hand, till the mass appearing uniform, it is to be collected in a heap: *clean* water is then to be added and stirred in, so as to make the mixture of the consistence of mortar. One treader, or, for expedition sake, two, is then to get on the board, and is to tread the mass well with his naked feet, working it chiefly with the heels: when trodden, it is to be turned over or thrown with a spade, and is again to be trodden, alternating these two processes for about twenty minutes.

Then mix on the fine sieve four quarts of finely-pounded clay and 2 lbs. of the pounded plumbago, and

sift a little of it over the mixture on the board; tread and throw it as already described, then sift on more of the fine clay and plumbago; and proceed in this manner till the ingredients are thoroughly incorporated, and the air has been all trodden out. The mixture should remain a night in lump, and the manufacture of melting-pots from it may begin the next morning.

The apparatus is, on the whole, very similar to that used by Mr. Anstey, and figured and described in the 43d vol. of the Society's Transactions, p. 32, consisting of a four-legged board, called a horse, for the workman to sit on, having near its fore end two uprights supporting a cross board, through which a round hole is made, capable of receiving the stem of the plug or core. Perpendicular to this hole is a socket for the reception of a pin that terminates the stem of the core, and tends to keep it upright and steady; the core, fixed on the top of the stem, and therefore an inch or two above the cross board, is a cone as large as the cavity of the melting-pot, with a border below to regulate the thickness of the pot. The best dimensions for the horse are 3 feet 6 inches in length, 9 inches in width, and $3\frac{1}{2}$ inches in thickness: it should be raised sufficiently high to allow the workman to sit on it with his feet resting on the ground, and the part where the thighs press should be rounded off and curved in a little. The cross board, which receives the stem of the core, should be raised 6 inches above the horse; and upon it is erected the square or gage, 18 inches high, and 10 inches in the blade. The cap of the core should be of basil or thin sheepskin.

Every thing being ready, the core is first to be rubbed well with plumbago, to prevent the cap from sticking to it; the cap is then to be put on the core, and a piece of

the mixed materials, or *walk*, as it is technically called, large enough for the melting-pot, is to be cut off from the mass. A pot capable of holding 70 lbs. of cast-iron requires 16½ lbs.; one for 35 lbs. of brass requires 10 lbs. The piece is to be worked and beaten up well on the walk-board, and is to be carefully made into a lump, which, a hole being then made in it, is to be fixed on the top of the core. The workman then takes a flat piece of board 4 inches square with a handle, called a *flatter*, and strikes it, beginning at the top and bringing down the clay gradually till it has got as low as the rim at the bottom of the core. During this, the stem of the core being grasped by one hand and turned gently round, the core itself, with the clay on it, is brought successively under the action of the flatter. Great care is to be taken during this operation that no air gets into it, or, if any bubble should appear in the clay, it is to be cut out with a knife. The bottom of the pot is now to be beaten quite flat, making it of the proper thickness by the gage, and observing that the core is not made to rise from its socket by any clay getting under the bottom of the core; for the consequence of this would be, that the bottom of the pot, though regulated by the gage, would be too thin by all the rising of the core. The workman now dips one hand in water, and presses the pot, rubbing it from top to bottom, while the other hand is turning round the core. The effect of this is, that the pot becomes of a uniform thickness, not varying in any part so much as $\frac{1}{16}$ of an inch. Finally, the pot is to be smoothed all round as well as at the bottom, and the process is completed. The first pot of each day's work should be cut up with a knife, to ascertain that there are no air-holes, and that the tempering has been properly performed.

A soft, new-made pot might get out of shape by being handled; the core, with the pot on it, is, therefore, taken off the horse and carried to a quiet sheltered place, and the pot being then set on its bottom, the core is raised out, leaving the cap within, which itself parts from the pot with a little management. The lip is then made by pressing the handle of the trowel from within against the edge of the pot, having placed the fore-finger and thumb, one on each side of the edge, to limit the action of the pressure.

It is by no means an unnecessary precaution to put the new-made pot in a quiet place, for if subject to any considerable jarring before it gets dry and hard, the pot will sink and not carry its rated charge of metal.

From twenty to thirty-six melting pots, of excellent quality, may thus be made in a day.

No. II.

PREVENTION OF DRY ROT.

The large SILVER MEDAL *was voted to Mr.* EDWARD CAREY, R.N., *for his method of Preventing Dry Rot in Ships' Timbers; a Model, illustrative of his method, has been placed in the Society's Repository.*

EVERY one knows that deciduous trees are full of sap during the period which begins in early spring, and terminates with the complete expansion of the leaves.